16

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1002485/AT	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. **PCT/AU 99/00776**	International filing date *(day/month/year)* 14 September 1999	Priority Date *(day/month/year)* 14 September 1998
International Patent Classification (IPC) or national classification and IPC **Int. Cl.**[7] B27B 13/04, 13/16, 29/10; B23D 53/08, 55/02; B26D 3/10		
Applicant ANTON, Con		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of **3** sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheet(s).

3. This report contains indications relating to the following items:

I	☒	Basis of the report
II	☐	Priority
III	☐	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	☐	Lack of unity of invention
V	☒	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	☐	Certain documents cited
VII	☐	Certain defects in the international application
VIII	☐	Certain observations on the international application

Date of submission of the demand 11 April 2000	Date of completion of the report 19 April 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer D.G. FRY Telephone No. (02) 6283 2130

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU 99/00776

I. Basis of the report

1. With regard to the **elements** of the international application:*

[X] the international application as originally filed.

[ ] the description, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of .

[ ] the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages , received on with the letter of .

[ ] the drawings, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of .

[ ] the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of .

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

[ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

[ ] the language of publication of the international application (under Rule 48.3(b)).

[ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readable form.

[ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. [ ] The amendments have resulted in the cancellation of:

[ ] the description, pages

[ ] the claims, Nos.

[ ] the drawings, sheets/fig

5. [ ] This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-21	YES
	Claims		NO
Inventive step (IS)	Claims	1-21	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-21	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

NOVELTY (N): Claims 1-21

The subject matter of the independent claims 1 and 15 are new in terms of the relevant state of the art [Article 33(2) PCT], since none of the documents cited in the International Search Report discloses the combination of all features set out in claims 1 and 15.

Claims 2-14 and 16-21 are dependent on claims 1 and 15 and are concerned with particular embodiments of the wood working tool and methods of forming different shapes of wood according to claims 1 and 15, and, thus, also meets the requirement of PCT Article 33(2).

INVENTIVE STEP (IS): Claims 1-21

The claimed methods and apparatus for manufacturing complex shapes provide means of:-

(a) manufacturing wooden articles specifically to shape, which will not require any additional working;

(b) increasing the rate of production;

(c) directly reproducing articles of different shapes and sizes.

For the above reasons, claims 1-21 are considered to involve an inventive step and, therefore, satisfy the criterion set forth in PCT Article 33(3).

INDUSTRIAL APPLICABILITY (IA)

The inventions defined in claims 1-21 satisfies the criterion set forth in PCT Article 33(4).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 10 May 2000 (10.05.00)	
International application No. PCT/AU99/00776	**Applicant's or agent's file reference**
International filing date (day/month/year) 14 September 1999 (14.09.99)	**Priority date** (day/month/year) 14 September 1998 (14.09.98)
Applicant ANTON, Con	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

11 April 2000 (11.04.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Pascal Piriou
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
B27B 13/04, 13/16, 29/10, B23D 53/08, 55/02, B26D 3/10

A1

(11) International Publication Number: WO 00/15399

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(71)(72) Applicant and Inventor: ANTON, Con [AU/AU]; 14–16 Horne Street, Thomastown, VIC 3074 (AU).

(74) Agent: TATLOCK, Alfred; A Tatlock & Associates, 208 Elgin Street, Carlton, VIC 3053 (AU).

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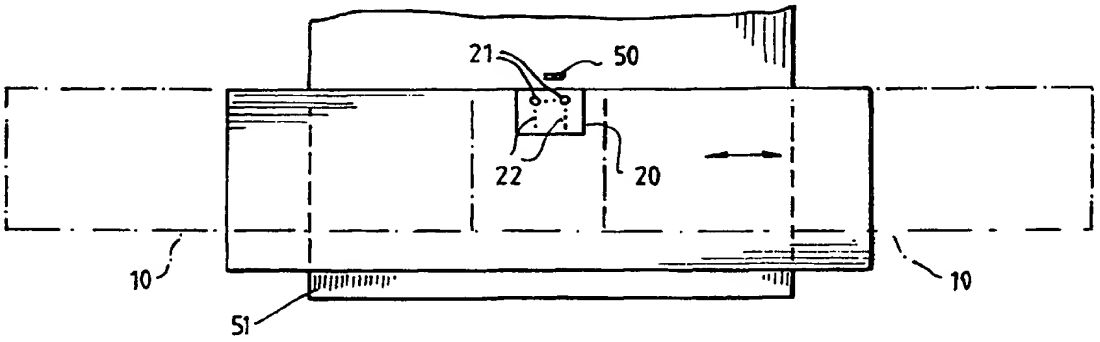
Published
With international search report.

(54) Title: METHOD OF AND APPARATUS FOR MANUFACTURING COMPLEX SHAPES



(57) Abstract

There is provided in association with a wood working tool having a cutting blade (40), a carrier (10) which can receive wood and guide means (21) associated with the carrier to cause it to move past the blade on a predetermined path (13), whereby timer (14) carried by the carrier can be cut reproducibly to size. The carrier may have a groove or the like which corresponds to the shape to be cut which is received by the guide means and on movement of the carrier, the interaction between the groove and the guide means causes the carrier to follow the required path. The tool can have means whereby a number of similar articles can be cut from a single piece of material and the cutting of similar pieces can be effected automatically.

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METHOD OF AND APPARATUS FOR MANUFACTURING COMPLEX SHAPES

This invention relates to a method and apparatus for manufacturing complex shapes, and is particularly useful for use with band saws, and will be described in relation to this application.

The practice in the woodworking industry where a number of shapes have to be cut using a band saw, has been to mark each individual shape on the timber to be cut, and then for a tradesman to cut around the marking.

Whilst a skilled tradesman can do this relatively quickly and accurately it does take a substantial degree of skill and no matter how good the tradesman, the individual items are marginally different in shape, and the subsequent sanding which also acts to bring them to final shape and identity can be time consuming.

It is the object of the invention to provide means whereby articles can be manufactured specifically to shape and which will be directly reproducible.

The invention includes in a wood working tool having a cutting blade, guide means adapted to cause a carrier to move past the blade on a predetermined path, whereby timber carried by the carrier can be cut reproducibly to size.

In a first form of the invention the carrier has a groove on the underside which corresponds to the final shape required and located on the bed of the band saw are guide devices which can be received in the groove so that the carrier is constrained to follow the groove as it is moved through the saw.

In order that the invention may be more readily understood we shall describe, in relation to the accompanying drawings, one embodiment of the invention.

In these drawings:

Figure 1 is a plan view showing the general arrangement of the device of the invention;

Figure 2 is a plan view of the carrier of the invention;

Figure 3 is plan view of material to be cut indicating the location of a number of parallel passes through the saw;

Figure 4 is an enlarged plan view of the carrier;

Figure 5 is a section along line 5-5 of Figure 4; and

Figure 6 is a view showing the guides located on a plate in the base of the saw and the alternative positions these may adopt.

In this specification, for convenience, we shall refer to the invention applied to cutting timber by a band saw but this is exemplary. The invention can also relate to the use of a router or even to a planer or sander. Where the word 'cut' is used, it is deemed to comprehend working of wood or similar material by any of these types of tools.

The concept of the invention to move timber past the blade 40 of a band saw 41 in such a way as to cut the timber to a predetermined shape without the operator necessarily having great skill with the use of the saw.

In the illustrated embodiment, we provide a carrier 10 which may be a wooden member, although it could be made of aluminium or some other metal if it is to be used to produce a very large number of articles, and the cost of producing a metal carrier would be justified.

In the underside 11 of the carrier there is provided a groove 12 which reflects the shape of the article to be cut and which is of a width so as to closely receive guide members 21, to be described hereafter.

It may be preferred that the side of the carrier, which is directed towards the blade, has a similar curve 13 which, in use, terminates just before the blade 40 so that whilst when the

carrier 10 is moved past the blade, there is no direct contact between the blade and the carrier but at all times the carrier is close to the blade to give good support to timber or similar material 14 located on the carrier.

Alternatively the carrier could be made so that its width is such that, at the closest point of the groove to the blade, the carrier is spaced from the blade by a small distance and, of necessity and every other position is spaced from the blade by a further distance.

The first of these arrangements is preferred basically because, as mentioned, it supports the timber 14 being cut throughout the length of the cut but if this is not necessary, the other form may be cheaper.

Fitted to the carrier there is a clamp assembly 30 which is adapted to hold the timber being cut and this includes quick release clamps 31 to enable a piece of timber 14 to be located and removed from the carrier rapidly. The actual form of clamp is not particularly critical to the invention. There are a number of types of clamps known in the woodworking industry which would equally well be useable with the invention.

The clamp assembly can include a rack drive pinions 32 which are connected to the carrier by trunnions 35 and has a pair of racks 33 which are at right angles to the longitudinal axis of the carrier.

These racks 33 may be in grooves 34 or the like of the assembly 30.

The pinions 32 are connected by a rod 36 to which there is a drive knob 37 connected.

Connected between the racks 33 there is a beam 38 to which, in turn, the clamps 31 are connected, the connection being possible at a number of positions depending on the length of the timber to be cut. The beam may be provided with a number of apertures 39 to provide connecting means for the clamp so that the clamps can be spaced to give a good support for timber of different lengths. As illustrated there are two clamps 31 but there could be more than this if required.

If required, fitted to the other side of the carrier 11, there is a stop 40 which is directed inwardly towards the body of the carrier and which may be adjustable by means of a clamp or the like 41. This may be supported by a bracket 42 connected to the carrier.

The clamps 31 may be adapted to rest on the upper surface of the timber 14 to be cut and may be formed to ensure that the timber is held firmly as will be necessary when the timber is being cut or being moved.

As illustrated, in Figure 6, the guide members 21 can be located on a plate 20 which is adapted to be set into the base 41 of the band saw, or I may provide an auxiliary base adapted to fit over the saw's original base, which auxiliary base is provided with a pair of guide members 21. As illustrated, the guide members 21 may be rollers, having their axes normal to the base and which are spaced apart along a line parallel to the blade of the saw.

The guide members 21 can be connected to the plate 20 at a number of positions 22 so as to be moveable to be nearer or further apart or closer or further from the blade. The positions 22 are shown to be apertures to which the guide members can be connected.

Where there are relatively slow curves it is desirable to have the guide members apart to give maximum stability and reproducibility.

Where the curves are relatively tight then to get the best following of the curves it is desirable to have the guide members closer together.

In a modified form of the invention, I may prefer to have the guide members located in a slot along which they are moveable and the members are biassed towards the opposite sides of the slot. In this arrangement, the optimum positioning of the guide members will occur automatically. Where the members are moving along a line effectively parallel to the saw blade, they will adopt positions at the each side of the slot, as the curve becomes sharper, they will move closer together against their bias and the degree of movement will depend on the sharpness of the curve. When the curve again becomes shallower, they will move apart.

Rather than using a cutout groove 12 in the underside of the carrier member 10, we could have a pair of grooves which are parallel and spaced, or even a central portion which is downwardly extending and which has, on each side, the same shape and guide members on the exterior of this, against which the, movement could occur.

When the device is to be used the timber 14 to be cut is located on the carrier 10 and clamped thereto by clamps 31.

If the carrier has its inner edge in the required curve, the first possibility discussed above, the timber must be clamped so that it overlays the carrier throughout the length of the carrier.

This location can be achieved by the use of the stop member 40 which, after location has been completed may be removed so as to cause no obstruction to the movement of the saw blade 40.

When the timber or other material is located, the carrier/timber combination is caused to move past the band saw blade, the constraints on the carrier by the groove 12 co-operating with the guide means 21 are such that the timber passes through the band saw and because of the transverse movements of the carrier forced on it by the groove, the required shape is provided on the edge thereof.

If, of course, a cut is being made for a second side of a member, assuming a member is to be symmetrical, then the timber must extend from the carrier by a distance equal to the required width of the member to be manufactured. This can be controlled by the location of the stop 41 and the manipulation of the knob 37 which causes the timber to be moved over the surface of the carrier and outwardly therefrom. Thus, by variation of the position of the stop 41, or control of the rack knob 37, the width of the timber being cut can be varied.

The operator would be at the end of the carrier at the left of Figure 4 so can remove the cut portions as cutting is completed, move the carrier backwards and then operate the rack knob until the timber reaches the stop 40.

It will be seen that correctly used the device of the invention can, not only, ensure that curves in timber, or for that matter plastic or other soft material, can be very closely replicated on separate pieces of timber or other material but also such curves can be replicated on two different sides of a single piece of timber, so that such articles as chair legs or arms which are curved can be readily manufactured and the devices so manufactured can be of extremely close tolerance, needing a minimum of finishing in the form of sanding or the like. Also, where a piece of timber wider than the required width of the article is used, two or several articles can be cut repetitively from the one piece of timber. This is shown on Figure 3 where a number of articles are shown dashed on the surface of a piece of timber.

It is possible to control the movement of the racks automatically so then when one piece of timber has been cut, and the carrier returned to its initial condition, the timber will be moved forwardly to automatically adopt the required position for the next cut. It is also possible to automate the cutting movements so that not only is the timber moved transversely when a cut is completed and the carrier is returned to its initial position but also to automate the carrier return so that there is little operator input once the timber is loaded onto the carrier until all of the possible components are cut.

It will be seen that the invention provides something which has not previously been available in the art and that is direct reproducibility of a particular shape without any necessity of marking and without the need for great skill in passing the timber being sawn through the band saw or other tool.

I claim:

1. In a wood working tool having a cutting tool, guide means adapted to cause a carrier to move past the tool on a predetermined but transversely variable path, whereby timber carried by the carrier can be cut reproducibly to size.

2. A wood working tool as claimed in claim 1 wherein the carrier has a groove on the underside which corresponds to the final shape required and, located on the bed of the cutting tool are guide devices which can be received in the groove so that as the carrier is moved through the saw it is constrained to follow the groove.

3. A wood working tool as claimed in claim 2 wherein the guide devices comprise upwardly directed members adapted to permit the groove to pass thereover with minimum resistance.

4. A wood working tool as claimed in claim 2 or claim 3 wherein the guide devices have an outer sleeve which is located on an inner post by way of bearings so the sleeve can rotate with respect to the post.

5. A wood working tool as claimed in any one of claims 2 to 4 wherein the guide devices can be spaced at different distances apart depending on the radius of curvature being cut.

6. A wood working tool as claimed in any preceding claim wherein the carrier comprises a body member on which the material to be cut can be located, clamp means being associated with the body member whereby the material to be cut can be retrained against movement relative to the carrier.

7. A wood working tool as claimed in claim 6 wherein the clamp means are associated with a beam which can be moved transversely to the body member which in turn causes movement of the material to be cut.

8. A wood working tool as claimed in claim 7 wherein the beam causes the material to be cut to be moved in a parallel manner until it contacts the stop member.

9. A wood working tool as claimed in claim 7 or claim 8 wherein by control of the position of the beam, the required location for the material to be cut is achieved.

10. A wood working tool as claimed in any one of claims 7 to 9 wherein there is a stop member against which the material to be cut can be butted so that it is correctly located for cutting.

11. A wood working tool as claimed in any preceding claim wherein the edge of the carrier which is directed towards the cutting tool is shaped to the same shape as the required cut so that the material being cut is supported close to the position of the cut being made.

12. A wood working tool as claimed in any preceding claim wherein when several members are to be cut from one sheet of material the material can be moved transversely relative to the blade automatically after completion of a cut and the return on the carrier to its initial position.

13. A wood working tool as claimed in claim 12 wherein the return of the carrier to its initial position and the transverse movement of the material are both effected automatically.

14. A wood working tool as claimed in any preceding claim wherein the tool is selected from the group comprising band saws, routers planers and sanders.

15. A method of forming or working complex shapes of wood or similar materials including mounting the material onto a carrier, associating the carrier with guide means in such a way that on longitudinal movement of the carrier, the guide means will cause transverse movement of the carrier, the carrier and guide means being in

association with a tool, so that the movement of the carrier is reflected by the operation of the tool on the material.

16. A method according to claim 15 where the carrier is provided with a groove in the underside thereof, the groove having the required shape of the cut or other working to be done on the material, the guide means being adapted to cooperate with the groove to cause transverse movement of the carrier when it is moved longitudinally.

17. A method according to claim 15 or claim 16, wherein the tool is a bandsaw and wherein the material on the carrier is cut by the bandsaw to a shape which corresponds to the shape of the guide means.

18. A method according to any one of claims 15 to 17, wherein the side of the carrier adjacent the saw blade has generally the same shape as required for the final cut material, so that the material before cutting is supported adjacent the point of cut.

19. A method according to any one of claims 15 to 18, wherein clamp means are associated with the carrier, the clamp means being adapted to permit movement of the material transversely of the carrier so that a number of cuts can be made from a single piece of material.

20. A method according to claim 19, wherein the clamp means are associated with a beam which can be moved transversely relative to the longitudinal axis of the carrier, thus permitting the material to be located at required positions for multiple cuts.

21. A method as claimed in any one of claims 15 to 20 wherein the transverse adjustment of the material to be cut or this movement together with the return of the carrier to its initial position after a cut are done automatically.

Fig. 1.

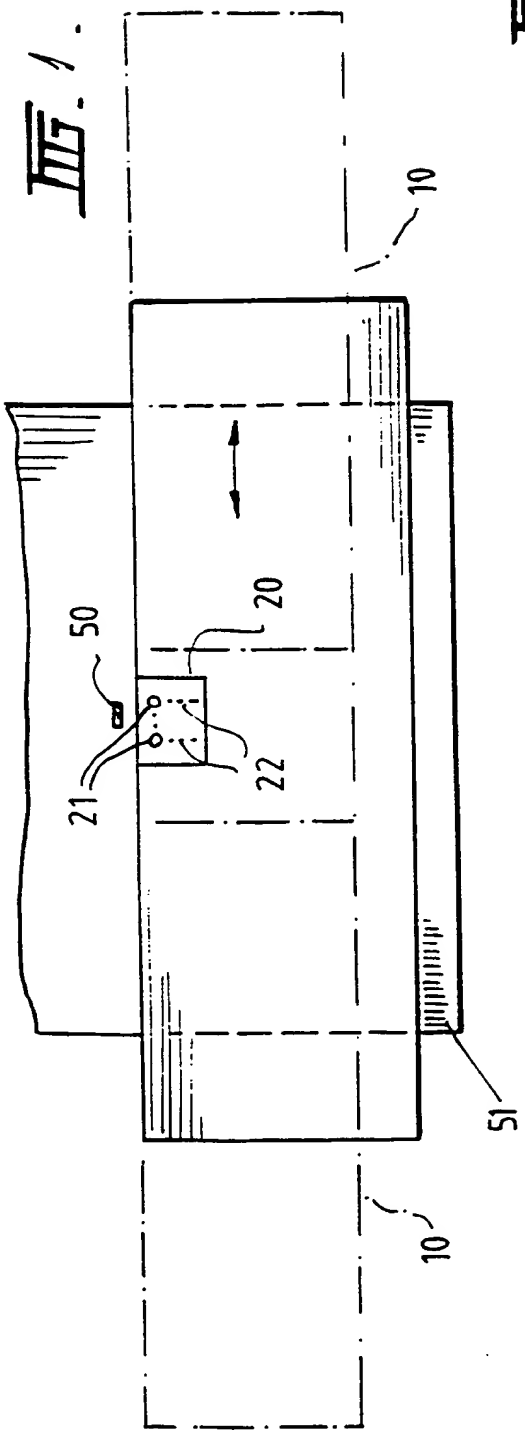
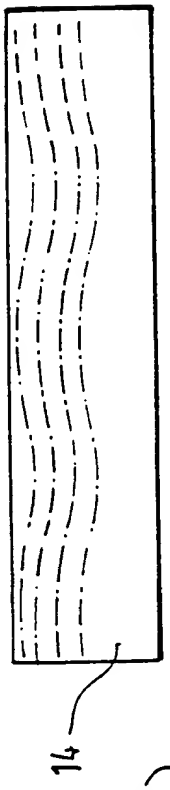


Fig. 3.



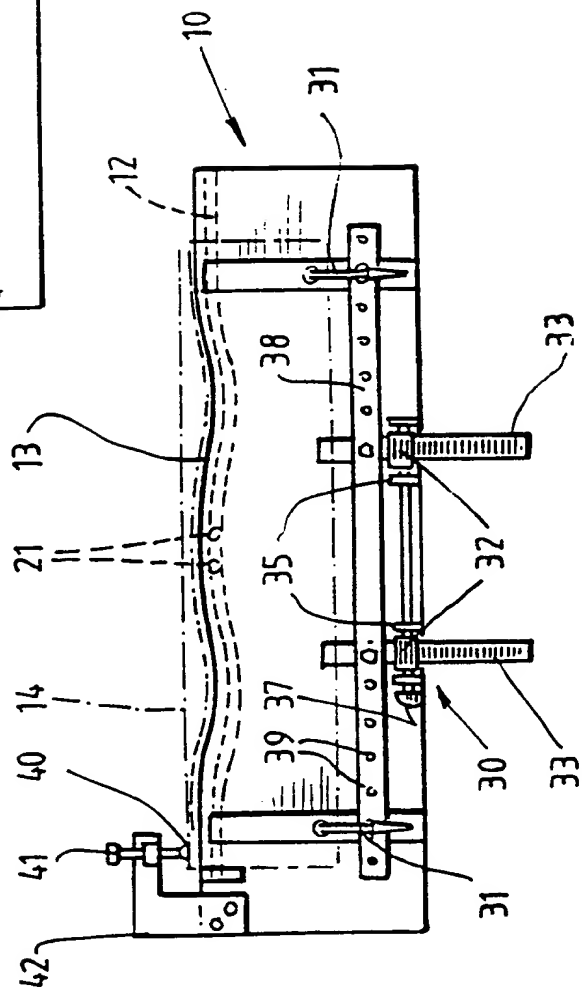


Fig. 2.

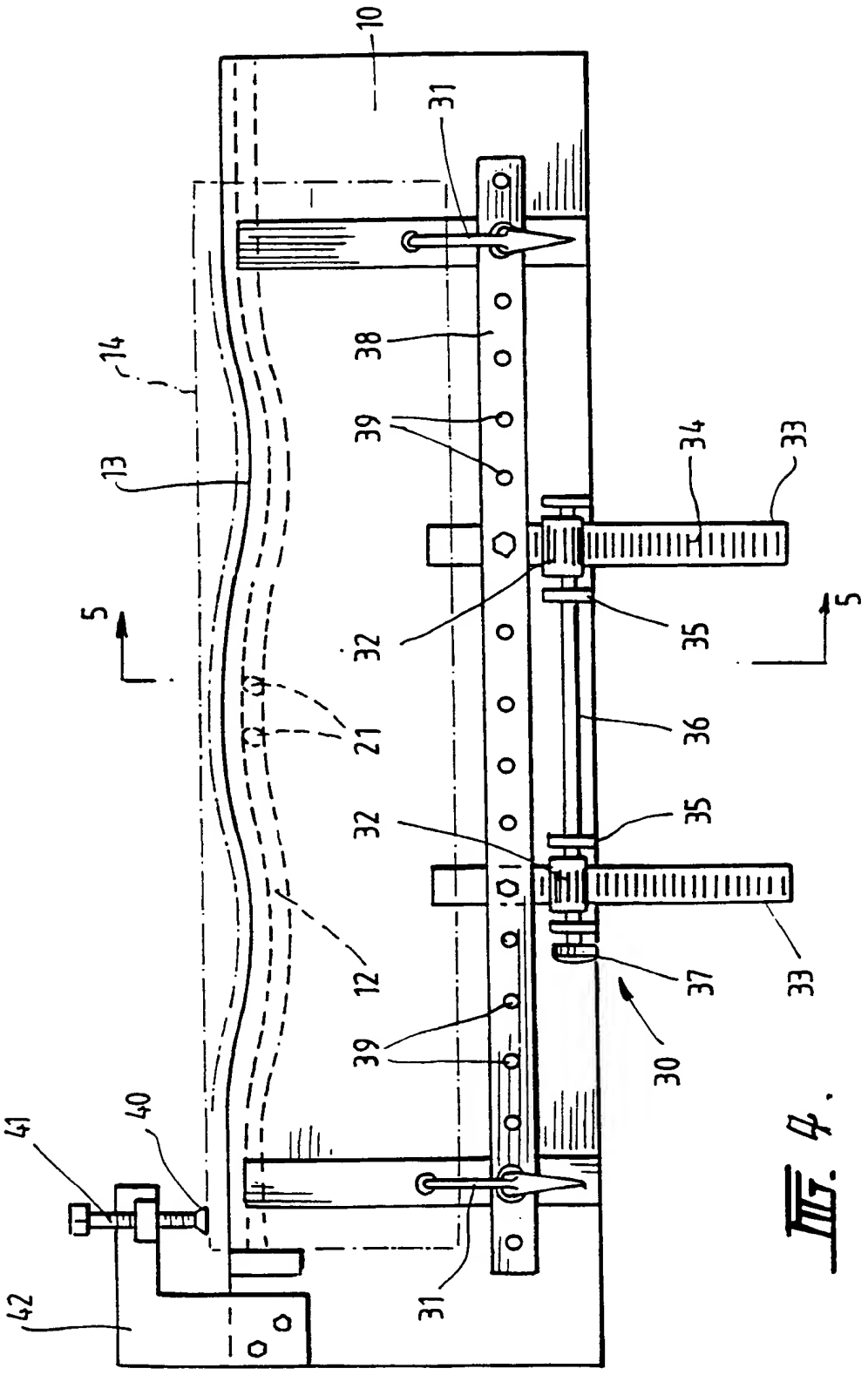


Fig. 4.

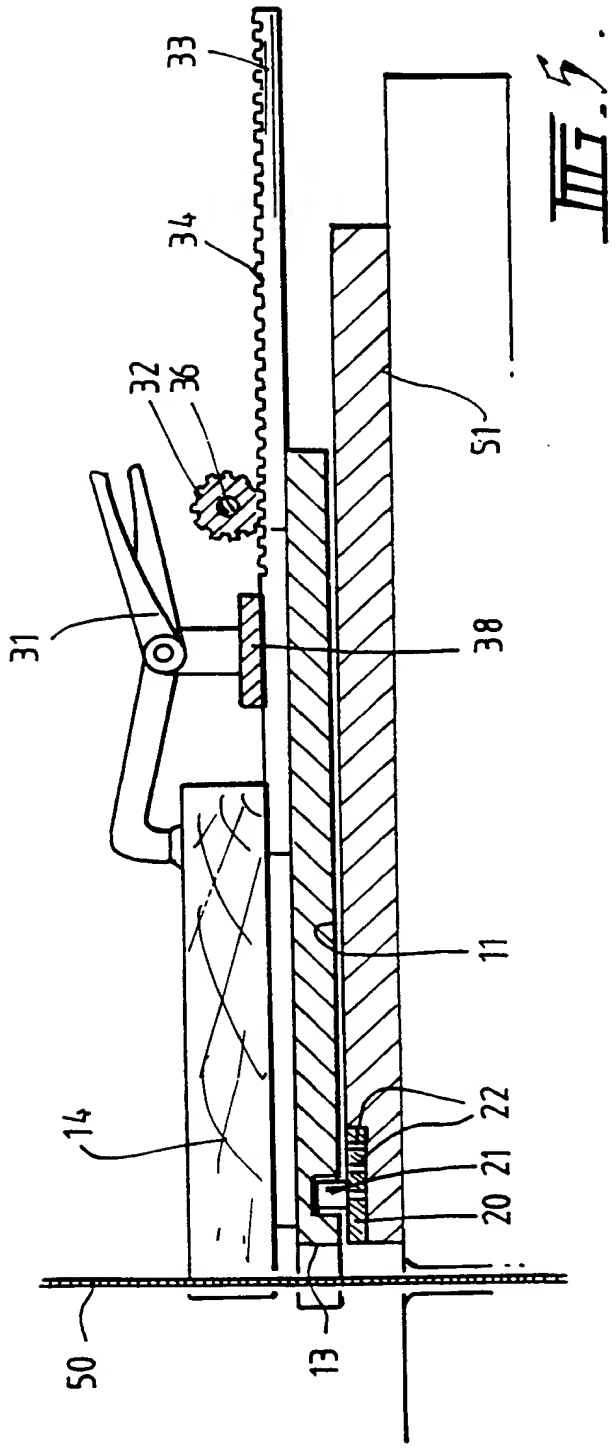


Fig. 5.

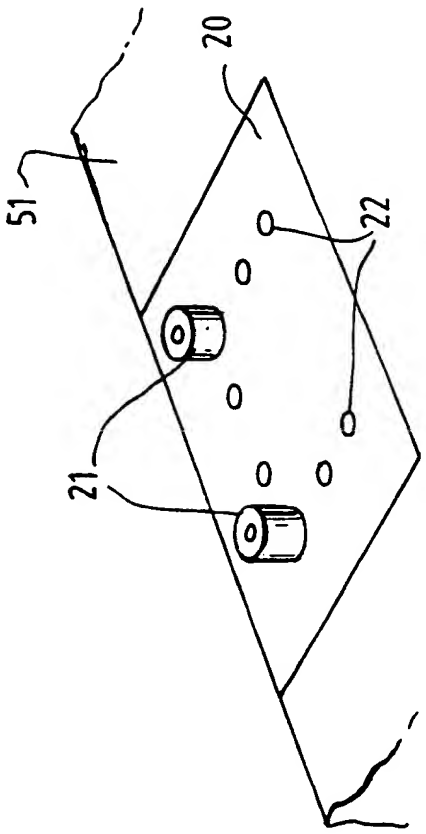


Fig. 6.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00776

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: B27B 13/04, 13/16, 29/10 B23D 53/08, 55/02 B26D 3/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: B27B 13/04, 13/16, 29/10 B23D 53/08, 55/02 B26D 3/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5038652 A(MARTIN et al.) 13 August 1991 whole document	1-21
A	US 5544558 A (HUGHES) 13 August 1996 whole document	1-21
A	US 4270426 A (RAPHAEL) 2 June 1981 whole document	1-21

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents:

"A" Document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search	Date of mailing of the international search report
29 October 1999	-9 NOV 1999
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No.: (02) 6285 3929	Authorized officer **D.G. FRY** Telephone No.: (02) 6283 2130

INTERNATIONAL SEARCH REPORT

international application No.
PCT/AU 99/00776

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2283451 A (FMC CORPORATION) 10 May 1995 whole document	1-21

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU 99/00776

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
GB	2283451	BR	9404290	CA	2134799	DE	4438282
		ES	2110891	FR	2711943	JP	7186091

END OF ANNEX

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00776

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A	GB 2283451 A (FMC CORPORATION) 10 May 1995 whole document	1-21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00776

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: B27B 13/04, 13/16, 29/10 B23D 53/08, 55/02 B26D 3/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: B27B 13/04, 13/16, 29/10 B23D 53/08, 55/02 B26D 3/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5038652 A(MARTIN et al.) 13 August 1991 whole document	1-21
A	US 5544558 A (HUGHES) 13 August 1996 whole document	1-21
A	US 4270426 A (RAPHAEL) 2 June 1981 whole document	1-21

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

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